Bureau of Land Management, Roswell Field Office
Environmental Assessment Checklist, EA# NM-510-2006-158

Resources	Not Present on Site	No Impacts	May Be Impacts *	Mitigation Included	BLM Reviewer	Date
CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT						
Air Quality			X		Hydrologist	
Floodplains	X				/s/ Michael McGee	10/5/06
Water Quality - Surface/Ground			X X	X	Geologist /s/ John S. Simitz Hydrologist /s/ Michael McGee	10/5/06
Cultural Resources			X		Archaeologist	
Native American Religious Concerns		X			Pat Flanary	9/26/06
Environmental Justice		X			/s/J H Parman	
Areas of Critical Environmental Concern	X				Plan & Env. Coord.	8/29/06
Farmlands, Prime or Unique		x			Realty Irene M. Gonzales	10-02-06
Invasive, Non-native Species			X		Range Mgmt. Spec. /s/ H. Miller	09/19/2006
Wastes, Hazardous or Solid	X				/s/J H Parman Haz. Mat Spec	10/18/06
Threatened or Endangered Species	X				Biologist /s/ Ernest Jaquez	08/28/06
Wetlands/Riparian Zones	X					
Wild and Scenic Rivers	x				Outdoor Rec. Plnr.	
Wilderness	x				***Paul Happel***	9/5/06
NON-CRITICAL ELEMENTS						
General Topography/Surface Geology		X			Sur .Prot. Spec. Richard G. Hill	10/18/06
Solid Mineral Resources		√			Geo/SPS /s/ Jerry Dutchover	10/18/06
Fluid Mineral Resources			X		Pet Engr/Geo /s/ John S. Simitz	10/17/06
Paleontology		X			Archaeology Pat Flanary	9/26/06
Soil			X	X	Hydrologist	
Watershed/Hydrology			X	X	/s/ Michael McGee	10/5/06
Vegetation			x		John Spain, Range Mgmt . Spec.	9/22/06
Livestock Grazing			x		John Spain	9/22/06
Special Status Species					Biologist	
Wildlife			X		/s/ Ernest Jaquez	8/26/06
Recreation			x		Outdoor Rec. Plnr.	
Visual Resources			x		***Paul Happel***	9/5/06
Cave/Karst			x			
Fire and Fuels					Fire Mgmt Officer Allan J Wyngaert Act.	10/4/06

Environmental Analysis

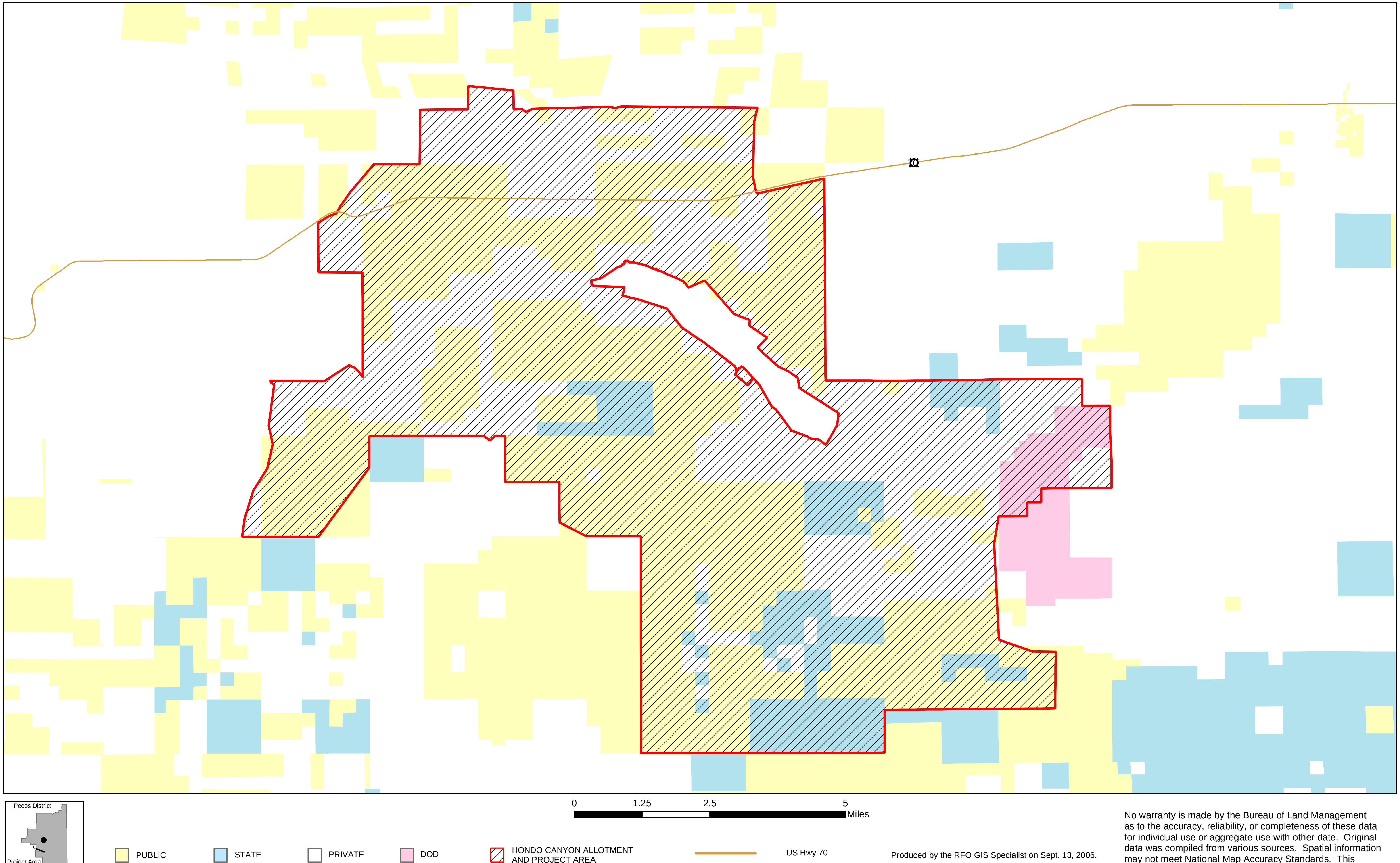
Hondo Grassland Restoration Project

NM-510-2006-158

Bureau of Land Management
Roswell Field Office
Roswell, New Mexico

September 12, 2006

HONDO GRASSLAND RESTORATION



Produced by the RFO GIS Specialist on Sept. 13, 2006.

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Environmental Analysis
Hondo Grassland Restoration Project

NM-510-2006-158

Bureau of Land Management
Roswell Field Office
Roswell, New Mexico

I. INTRODUCTION

Purpose and Need for the Proposed Action

The purpose of the Hondo Grassland Restoration Project is to meet the goals and objectives of restoring the rangeland ecosystem to an ecological condition that was similar to its historical structure, dynamics, diversity and watershed functionality within the Hondo Canyon Ranch, Allotment #64060. This desired plant community would provide for the stabilization of both the biotic and hydrologic components of the watershed, restore and support habitat requirements for flora and fauna within the area and serve to reduce hazardous fuel loads that could eventually contribute to an uncontrollable catastrophic wild land fire event.

The vegetative composition, within the Hondo Grassland Project area, has shifted from a desert grassland dominated community, with scattered shrubs, to a shrub dominated landscape characterized by a lack of herbaceous ground cover and an increase in bare ground. The increase in shrubs has resulted in an increase in dead and down fuel loadings, as well as a decrease in the values of an under-story component. This vegetative modification has a negative affect on the watersheds ability to withstand periodic drought events, accelerated erosion impacts, sustain a healthy biodiversity and ability to provide for quality habitat.

This environmental assessment will analyze impacts associated with various methods and techniques available for meeting the intended objectives of this action within the project area (see map), identify mitigation measures to minimize or eliminate impacts to affected resources and evaluate cumulative impacts in relation to threshold levels identified for the watershed as a whole.

<u>Conformance with Land Use Plans</u>: The proposed activity is addressed as part of the Roswell Resource Management Plan (October, 1997).

<u>Relationship to Statues, Regulations or Other Plans:</u> The proposal to implement a vegetation treatments on mesquite *(Prosopis glandulosa* and *P. jugans*), cholla (*Opuntia imbricata),* catclaw acacia *(Acacia* spp.) and creosote *(Larrea tridentata*) is consistent with and tiered to the New Mexico Record of Decision dated July, 1991, for the Vegetation Treatment on BLM Lands in Thirteen States Final EIS (FEIS) of May 1991; 1994 Environmental Impact Statement for Rangeland Reform; the Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1700 et seq.); the Taylor Grazing Act of 1934 (TGA) (43 U.S.C. 315 et seq.); the Public Rangelands Improvement Act of 1978

(PRIA) (43 U.S.C. 1901 et seq.); the Federal Noxious Weed Act of 1974 (7 U.S.C. 2801-2813), as amended by Section 15, Management of Undesirable Plants on Federal Lands, 1990; and the Carson-Foley Act of 1968 (P.L. 90-583).

II. PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

The proposed treatment area is located in western Chaves County and eastern Lincoln County, New Mexico (see attached map). The project area for the Hondo Grassland Restoration Project contains approximately 76,900 acres with 33,000 acres of public land. Of this total, approximately 16,000 acres of public land or 21 percent of the total watershed is proposed to be treated. The goal of the proposed action is to restore overall rangeland health and watershed functionality through the use of chemical, prescribed fire, and mechanical extractor treatments in those areas where the vegetative composition and production levels are no longer meeting desired plant community objectives. To accomplish this goal, the proposed action would concentrate treatments on areas that possess the following characteristics:

1. the vegetative community is at a level of 60 percent or greater departure from potential for the site,
2. the mesquite component of shrubs meet or exceed one-third of the total percent of shrub cover,
3. the amount of cholla meets or exceeds 100 plants per acre,
4. the amount of catclaw acacia meets or exceeds 50 plants per acre,
5. the creosote bush component of shrubs meets or exceeds 20 percent of the vegetative canopy,
6. the specific upland community is not currently meeting one or more rangeland health standards and,
7. the treatment would have no negative impact on plant or animal components of the community.

To reduce catclaw acacia within the project area, herbicide treatment would consist of the application of pelletized tebuthiuron or an approved alternate herbicide by aerial application. Application rates for the herbicide would be 0.75 pounds of active ingredient per acre of tebuthiuron. Application of the herbicide would occur between the first of June and the end of following February; avoiding the nesting season for local quail *(Callipepla* spp).

To reduce creosote within the project area, herbicide treatment would consist of the application of pelletized tebuthiuron or an approved alternate herbicide by aerial application. Application rates for the herbicide would be 0.5 pounds of active ingredient per acre of tebuthiuron. Application of the herbicide would occur between the first of June and the end of following February; avoiding the nesting season for local quail.

To reduce mesquite within the project area, herbicide treatments would consist of the application of triclopyr and clopyralid or an approved alternate herbicide by aerial application. The liquid herbicides triclopyr (Reclaim) and clopyralid (Remedy) would be applied at a rate of about 0.25 pound of active ingredient each per acre to the areas that are dominated by mesquite or meet the criteria listed above. The herbicides would be aerially applied in the spring and early summer (April through July).

To reduce the amount of cholla within the project area, herbicide treatments would consist of the application of picloram or an approved alternate herbicide by aerial application. Application rates for the herbicide would be 0.5 pounds of active ingredient per acre. The herbicide would be aerially applied in the warmer months, when air temperature is above 60° F and has not been 32° F or below for the preceding 24 hours.

The following measures would be applied to all aerial herbicide applications within the project area:

a. Irregular boundaries for maximizing edge effect will be incorporated into all methods of treatment. Undisturbed islands of natural vegetation will be left, where appropriate, to minimize negative impacts to wildlife. Additional islands of untreated vegetation would be left as needed to create or maintain the mosaic pattern that provides suitable habitat for such species as scaled quail and loggerhead shrikes. The leave out areas would be equal to or greater than 15% of the total proposed treatment area.
b. All livestock will be removed from treated pastures prior to aerial spraying or ground applications involving foliar spray. Livestock should be removed after the first 1/2 inch of moisture following pellet treatment. Herbicide label requirements will be met when grazing domestic animals after application. Livestock grazing will be deferred for a minimum of two consecutive growing seasons. The growing season usually begins at the onset of the summer rains (July 1) and continues until first frost (October 31). Livestock numbers would not increase as a result of treatment.
c. Livestock would be removed prior to treatment. Treatment areas would be deferred from livestock grazing for at least two consecutive growing seasons following treatment. The growing season usually begins at the onset of the summer rains (July 1) and continues until first frost (October 31). Livestock numbers would not increase as a result of treatment.

Management treatments and project design features relating to vegetation treatment activities are presented in the1991 Vegetation Treatment FEIS pages <u>1-33</u> to <u>1-35</u>,. All mitigation measures adopted in the Record of Decision for the FEIS are incorporated as additional project design features.

Prescribed fire may be used as a primary treatment or as a secondary method of treatment after chemical application to meet the goals of the Desired Plant Community within the project area. All prescribed fires would be conducted under a site specific Prescribed Fire Burn Plan as per BLM Manual 9214. The Prescribed Fire Burn Plan would specify the weather and fuel conditions, fire behavior, holding resources, and prep work (i.e. sites to be protected, line construction) needed to safely and efficiently meet the objectives for the project. The Prescribed Fire Burn Plan would identify any persons and agencies to be notified concerning the prescribed fire project. The Prescribed Fire Burn Plan would also identify any potential receptor sites and smoke management mitigation measures necessary to minimize impacts to the airshed and receptor sites.

Prescribed fire control lines would utilize natural barriers (i.e. rock outcrops, bare ground), bladed roads and two-tracks when possible to avoid creating new surface disturbance. There would possibly be areas where control lines would have to be constructed using heavy equipment. Before implementing this phase of the proposed action, the appropriate level of cultural resources inventory will be determined by following the procedures described in the "Protocol Agreement between the New Mexico Bureau of Land Management and New Mexico State Historic Preservation Officer" (June 2004) or successor documents (the Protocol Agreement).

The following measures would apply to all prescribed burn treatments within the project area:

a. Range improvement projects (pipelines, fences) would be excluded from fire when possible. Oil and gas related infrastructure would also be protected from fire. Power lines and communication lines would be excluded as well.
b. Grazing deferment would be necessary prior to prescribed treatment, each project area would be evaluated and the proper deferment will be applied. A minimum of two growing seasons would occur prior to areas being augmented with prescribed fire.
c. Burning operations would be conducted with techniques to avoid smoke impacting traffic on U.S. Highway 70/380.
d. Treatment areas will be deferred from livestock grazing for at least two consecutive growing seasons following treatment. The growing season usually begins at the onset of the summer rains (July 1) and continues until first frost (October 31). Livestock numbers would not increase as a result of treatment.

B. Alternative A – Manual Treatment

Under this alternative hand-operated power tools and hand tools would be used to cut and clear the treatment area of mesquite, creosotebush, acacia or cholla. Workers would cut plants at ground level and pull, grub or dig out root systems to prevent sprouting and regrowth. Tools to be used would include hand saws, axes, grub hoes, hand pruners and chain saws. All materials removed would require hand piling and burning at a later date.

C. Alternative B – Mechanical Treatment

Under this alternative wheeled or crawler-type tractors would be the only treatment used to grub out mesquite, creosotebush, acacia or cholla in the project area. Tractors would be confided to working on slopes of less than 30 percent. Vegetative debris would be piled or left in windrows for reduction by burning. Rest periods from livestock grazing would also apply to these types of treatments.

D. No Action Alternative

No treatment would be conducted to reduce the amount of catclaw acacia, mesquite, cholla, and creosotebush in the treatment area.

E. Alternatives Considered But Not Analyzed

Biological Treatment –
Currently BLM is not aware of any specific effective biological control for catclaw acacia, mesquite, cholla or creosote. Therefore, biological treatments as a primary control for these brush species will not be analyzed.

Treatment with Other Chemicals –
There are other chemicals on BLM's list of approved herbicides that could be used to control catclaw, creosote, mesquite and cholla. A partial list of these chemicals include 2,4-D, dicamba, glyphosate, and hexazinone. BLM rejected their use due impacts to non-target vegetation and/or increased impacts to soil or water resources. Therefore, the use of these chemicals as a primary control for catclaw, creosote, mesquite or cholla will not be analyzed.

III. AFFECTED ENVIRONMENT

A. General Setting

The proposed treatment areas are located within the Hondo Canyon Ranch, Allotment #64060. The area is physically located along Highway 70/380, approximately 17 miles west of Roswell. This allotment totals 64,185 acres of which 32,874 is public land, 5,827 is State Land, 1,424 is Department of Defense land and 24,060 is private land.

The affected environment of the area is generally discussed in the Roswell Resource Management Plan (RMP). Refer to this plan and the following for a complete description (Chapter 2). Only those resources actually impacted by the proposed action will be addressed in this document.

Both the surface and mineral estates are in public ownership. An inspection of the Master Title Plats revealed the following title information:

Oil and Gas Leases: There are no Oil/Gas leases filed with BLM in the area proposed for this project, as of August 31, 2006.

There are no existing mining claims filed with BLM in the area proposed for this project, as of August 31, 2006.

The regional uses are ranching, along with seasonal hunting and recreation.

The critical elements of Area of Critical Environmental Concern's, Prime or Unique Farmlands, Floodplains, Native American Religious Concerns, Noxious and Invasive Species, Hazardous or Solid Wastes, Wetland and Riparian Zones, Wild and Scenic Rivers, and Wilderness are no present within the treatment area and will not be affected.

B. Affected Resources:

Air Quality: The project area is rated as a Class II air quality area, which allows for moderate development within the standards of the State of New Mexico and the Federal Air Standards.

Soil: The project area is predominately Ector-Kimbrough association, gently sloping and Ector-Rock Outcrop association, moderately steep. The Ector-Kimbrough association is generally found on uplands with slopes of 0 to 8%. Elevations run from 4,000 to 4,500 feet. This association consists of 55% Ector very cobbly loam and 30% Kimbrough gravelly loam; the remaining percentage includes Rock outcrop and some deeper soil. The Ector-Kimbrough association is very shallow and shallow and is well drained. It is formed in material derived dominantly from limestone and is generally about 7 inches deep. Permeability is moderate and the effective rooting depth is 4 to 20 inches. Available water capacity is very low, runoff is rapid and the hazard of water erosion is high.

The Ector-Rock Outcrop association is found on hills, with slopes of 15 to 50%. The Ector soils make up 60% and the Rock outcrop, 25%. Kimbrough soil contributes the majority of the remaining 15%, and is usually found on summits and some deeper soil on hillsides. The rock outcrops consist of exposed limestone where runoff is rapid.

Water Quality:

Surface Water: The proposed treatment area is located with the Hondo Basin of New Mexico. There are no perennial streams, rivers or riparian areas in the area proposed for treatment.

Ground Water: The project area is in the Roswell Ground Water Basin, depth to ground water is approximately 400 to 600 feet in the San Andres formation.

Recreation: There would be no direct or indirect impacts to recreation.

Off Highway Vehicle designation for public land within this allotment are classified as "Limited" to existing roads and trails.

Cave/Karst: The project area is located in an area of medium cave/karst potential and no karst features or significant caves are found in the vicinity of the proposed treatment area.

Visual Resource Management (VRM): The area is considered to contain both Class III and IV Visual Resource Management Areas (VRM). In a Class III VRM, contrasts to the basic elements caused by a management activity may be evident and begin to attract attention in the landscape. The changes should remain subordinate to the existing landscape. In a Class IV VRM, contrasts may attract attention and be a dominant feature in the landscape in terms of scale, however, the changes should repeat the basic elements of the landscape.

Vegetation: The area is predominately grass covered with a mixed overstory of creosotebush, catclaw acacia, mesquite or cholla. The ecological sites in the project area are a mixture of Limestone Hills CP-4, Shallow and Very Shallow CP-4 Range sites, Loamy SD-3, Shallow SD-3 with some intersecting Draws SD-3 range sites. Potential plant communities range from 45 to 75% grasses, 3 to 45% woody component, and 5 to 25% forbs of total vegetative production. The shrubs should make up 5 to 20% of cover. Catclaw acacia should not exceed 5 to 10% of the vegetative production of the

Limestone Hills CP-4 site. In the remaining sites, catclaw should not exceed 5%. Creosote, mesquite and cholla are either included in the other perennial scattered shrubs, not to exceed 10% all together; or are not listed in the range site at potential.

Other shrubs which are potentially found on the range sites include catclaw mimosa (*Mimosa biuncifera*), apache plume (*Fallugia paradoxa*), cholla, sotol (*Dasylirion leiophyllum*), winterfat (*Eurctia lanata*), wolfberry (*Lycium berlandieri*), threadleaf groundsel (*Senecio longilobus*), sacahuista (*Nolina microcarpa*), lechuguilla (*Agave lechuguilla*), algerita (*Berberis trifoliolata*), mountain mahogany (*Cercocarpus montanus*), dalea species (*Dalea spp*.), sumac species (*Rhus spp*.), juniper (*Juniperus spp*.), oak species (*Quercus spp*.), Bigelow sagebrush (*Artemisia bigelovii*), four-wing saltbush (*Atriplex canescens*), yerba-de pasmo (*Baccharis pteronioides*), ephedra species (*Ephedra spp*.), range ratany (*Krameria glandulosa*),and javelinabush (*Condalia ericoides*); all contributing a total of approximately 2 to 10% of the vegetative production.

The existing plant community (per the 2003 vegetative study, located in Hondo Pasture in a Shallow CP-4 Range Site) consisted of 16% grasses, 82% shrubs and 1% forbs by production; in this particular Range Site, at potential the community should include grasses 60 to 75%, woody 15 to 20% and forbs 5 to 10%, catclaw acacia should not exceed 5%; in 2003 catclaw was estimated at 15%; in 1997 catclaw was estimated at 12%; in 1983 catclaw contributed less than 2% of the production. According to the Roswell RMP, catclaw acacia reaches the threshold for consideration for treatment at 50 plants per acre and creosote at 20% of the vegetative canopy.

Invasive, Non-native Species: There are no known populations of invasive or non native species within the project

Wildlife: The project area provides habitat for desert mule deer (*Odocoileus hemionus*), scaled quail *(Callipepla squamata),* mourning dove (*Zenaida macroura*), raptor species and various non-game species.

Special Status Species: The 1999 grazing authorization environmental assessment (EA) for allotment #64060 states the only threatened or endangered species on this allotment was the bald eagle *(Haliaéetus leucocéphalus),*. That EA went on to state that bald eagles and peregrine falcons *(Fálco peregrínus),* may be observed in the general geographic area during migration or winter months. The Roswell RMPA states the bald eagle only has the potential to occur seasonally (November through March). For more information, see page AP11-31 of Appendix 11 of the Roswell RMP.

The US Fish & Wildlife Service (FWS) reviewed and concurred with BLM's finding of Not Likely to Adversely Affect the peregrine falcon No Affect on the bald eagle and No Affect on the aplomado falcon *(Fálco femorális).* FWS's concurrence and their biological opinion on the Roswell RMP can be found in Appendix 11 of the Roswell RMP.

Since 1997 nothing has changed with regards to these three species. There have been no documented sightings of eagles or either falcon species on the allotment or in the treatment area. No additional critical habitat for these species has been designated in the allotment or the treatment area.

In 2005, FWS added three snail species and an amphipod to the threatened or endangered species list in Chaves County. The habitat for these species, however, is confined to springs and sinkholes on the Bitter Lake National Wildlife Refuge, upstream from the confluence of the Hondo and Pecos Rivers and located approximately 30 miles away. Therefore, any treatment would not likely affect these four species

Livestock: The Rio Hondo Cattle Company c/o Ford Secure Trust is permitted to run 903 sheep, 1,397 cattle and 35 horses on the allotment yearlong.

IV. ENVIRONMENTAL IMPACTS

The actions described in Section II of this assessment that would cause environmental impacts are presented in Chapter 3 and summarized in Table 1-9 (Alternative 1) of the 1991 Vegetation Treatment FEIS. Analysis discussions in that FEIS have no impact of importance upon the following resources; climate, topography, minerals, utilities, communication sites and energy use.

A. Impacts of the Proposed Action

No impacts have been identified that exceed those addressed in the 1991 Vegetation Treatment FEIS. The following are impacts of importance based upon site specific analysis of the proposal.

Air: The most significant impacts on air quality would be moderate noise and minimal chemical drift from aerial application of the herbicide. Impacts would be temporary, small in scale, and quickly dispersed throughout the area. These factors, combined with standard management practices (stipulations), minimize the significance of potential impacts. Federal, State, and local air quality regulations would not be violated. Standard management practices for aerial application of herbicides would limit the amount of drift into non-target areas.

As tebuthiuron is pelletized, droplet size and drift of liquid herbicide is not a factor. The use of aircraft to apply the herbicides could temporarily cause noise levels to reach 90 dbA; however, no long-term effects are anticipated. The chemical nature of the herbicide is such that no residue will be left in the soil or atmosphere after approximately 3 years.

The use of aircraft to apply the herbicides triclopyr, and clopyralid to control mesquite, or picloram to control cholla could temporarily cause noise levels to reach 90 dbA; however, no long-term effects are anticipated. Standard management practices include using spray equipment designed to produce 200 to 800 micron diameter droplets and prohibiting spraying when the wind speed exceeds 6 miles per hour or blows in the wrong direction. The chemical nature of the herbicide is such that no residue would be left in the soil or atmosphere after approximately 3 years.

Treatment with prescribed fire would have an immediate, but short term impact on air quality in the immediate area. The burn out time for grasses is usually less than 60 minutes. Using smoke emission models, the total suspended particulate would be approximately 0.41 tons.

Soil: Vegetation treatments may affect the physical characteristics of soil directly, alter the abundance and types of vegetation that may shield it from erosion, or alter the presence and abundance of microorganisms or larger organisms that contribute to overall soil quality.

Granular formulations of herbicides such as tebuthiuron release the herbicide into the soil plant root zone with subsequent chemical uptake and absorption by the targeted plants. Removal of solid stands of vegetation by chemical treatment may result in short-term, insignificant increases in surface erosion that would diminish as vegetation reoccupies the treated site. The speed of site revegetation and the plant composition of the new vegetation depends on the persistence and selectivity of the herbicide. Table 3-3 of the 1991 Vegetation Treatment FEIS (page 3-23) gives a general description of vegetation susceptibility of herbicides.

Triclopyr, clopyralid and picloram are liquid formulations that are applied on to the foliage of the targeted vegetation, although soil also may be a major receptor for these chemicals, because whether applied aerially or by truck –mounted and backpack units, some of the applied herbicide is deposited onto the soils. Removal of solid stands of vegetation by chemical treatment may result in short-term, insignificant increases in surface erosion that would diminish as vegetation reoccupies the treated sites.

Although herbicides would not alter a soil's physical properties, there may be indirect effects on microorganisms. Depending on the application rate and the soil environment, herbicides can either stimulate or inhibit soil organisms. When herbicide-treated vegetation decomposes, the resulting addition of organic matter to the soil can support increased populations of microorganisms. Soil microorganisms can metabolize herbicides and often are reported to be responsible for herbicide decomposition (Norris and Moore, 1981). However, certain herbicides may inhibit microorganism growth or may produce more toxic effects and increase mortality rates.

The effects of the proposed action on soil would be substantial. The increased organic matter, caused initially by acacia and creosote leaves, stems and roots and secondarily by the increased production of grasses and forbs would improve the fertility of the soil.

Prescribed burning may increase the erosion potential until the perennial vegetation reestablishes. Extremely intense fires would cause a higher than desired mortality on all plant species, resulting in the exposure of excess amounts of bare ground over a longer period of time and, consequently, greater soil loss. However, extremely intense burning would be avoided by burning within favorable prescriptions. Because fibrous rooted perennial grass species increase soil stability, soil erosion would be reduced below present levels when grasses become re-established.

Burning increases nutrient cycling by releasing nutrients that had been tied up in litter and plant material back into the soil. Soil temperatures of burned areas are usually higher than those of adjoining unburned areas. This is part of the reason that burned areas typically green-up earlier than unburned adjoining areas.

The competition for water and nutrients will be decreased as the treatment takes effect. Grasses and herbaceous plants may be affected by the treatment during the first year. An increase in ground cover (grasses and forbs) is expected by the second growing season. This ground cover will help minimize erosion and increase infiltration of the surface water. Some soil micro-organisms may be negatively impacted for the short term duration of the treatment. Microbial activity is expected to resume at present levels once dispersion of the chemical is complete.

Water: Herbicides applied to the land may enter surface or ground water. Herbicide use also may produce minor increases in stream nutrients, stormflows, and sediment yields.

<u>Surface Water Impacts</u>: Entry of herbicides into surface water is discussed in the risk assessment (Appendix E of the 1991 Vegetation Treatment FEIS). Herbicides may enter surface water during treatment through accidental direct application or drift, or after treatment through surface or subsurface runoff. To pollute the water, herbicides must be present in the water at concentrations high enough to impair water quality at point of use.

Buffer zones reduce drift impacts on sensitive areas, while wind increases drift impacts. Mitigation requires buffer of 100 feet (aerial). After treatment, herbicides may enter streams by subsurface flow or by movement in ephemeral channels. Key factors that would affect peak concentration include the presence of buffers, storm size, herbicide properties, soil properties and downstream mixing and dilution.

Large storms rarely produce high concentration because herbicides are diluted by large water volumes, while small storms may not produce enough flow to move herbicides into streams. Intermediate storms often produce higher concentrations of pesticides in streams relative to the other two situations because of the resulting streamflow is sufficient to mobilize the herbicides but not large enough to substantially dilute the material.

The amount of herbicide available for movement from the site of application with surface or infiltrating water will be determined, in part by the herbicides persistence. Herbicide persistence is usually expressed in terms of "half-life". This is the typical length of time needed for one-half of the total amount applied to break down to substances that are no longer of toxicological concern. While a herbicide's soil half-life in practice is influenced by local conditions such as soil type and climate, it is useful for describing the relative rates at which various herbicides are broken down in the soil.

Sunlight, temperature, soil and water pH, microbial activity and other edaphic characteristics may affect the breakdown of herbicides. Soil organic matter and soil properties such as moisture, temperature, aeration, and pH all affect microbial degradation. Microbial activity increases in soil that is warm, and moist with a neutral pH. In addition to microbial action, chemical degradation of herbicides can occur by reaction with water, oxygen or other chemicals in the soil. As soil pH becomes extremely acidic or alkaline, microbial activity usually decreases, however these conditions may favor rapid chemical degradation.

Table 3-6 of the 1991 Vegetation Treatment FEIS (page 3-45) gives field half-lives for the 19 herbicides proposed for use in the FEIS. Tebuthiuron has a soil half-life of 360 days (with a range of reported half-life of 13 to 450 days) and is considered to be a “persistent herbicide”. Persistent herbicides are those with typical half-lives in excess of 100 days**.** Triclopyr has a soil half-life of 46 days (with a range of reported half-life of 30 to 90 days); clopyralid has a soil half-life of 30 days (with a range of reported half-life of 12 to 70 days); picloram has a soil half-life of 90 days (with a range of reported half-life of 20-277) days and all are considered to be a “moderately persistent herbicide”. ”Moderately persistent herbicides are those with typical half-lives of 30 to 100 days**.** These values are considered most representative of the values reported in the literature, as the rate of degradation by natural processes is not only dependent on the herbicide chemistry, but also environmental factors.

In addition to degradation, these herbicides may be unavailable for movement with surface or infiltration water due to volatilization and plant uptake. Volatilization is the loss of herbicide vapor to the atmosphere from plant and soil surfaces. The rate of volatilization is determined by the herbicide’s vapor pressure and how strongly it is adsorbed. Vapor pressures for the herbicides proposed for use in the 1991 Vegetation Treatment FEIS are given in Table 3-6 (page 3-45).

The vapor pressure for tebuthiuron is 2.0 x 10-6 mm HG\g. The vapor pressure for triclopyr is 1.3 x 10-6 mm HG\g. The vapor pressure for clopyralid is 0 HG\g. The vapor pressure for picloram is also 0. The higher the vapor pressure the greater the potential for loss due to volatilization. Also, higher temperature usually results in increased volatilization. The degree of plant uptake is partially determined by the herbicide’s water solubility. The more water soluble an herbicide is, the greater the possibility for plant uptake.

Soil adsorption is also important in determining mobility in surface or infiltrating water. Adsorption of a herbicide varies with the properties of the chemical, as well as the soil’s texture (relative proportions of sand, silt, and clay), moisture level, and amount of organic matter. Soil high in organic matter of clay tend to be the most adsorptive, and sandy soils low in organic matter least adsorptive. Therefore, the higher the organic matter content of the soil, the more adsorptive the soil and the less likely the herbicide is to move from the point of application.

The degree of herbicide adsorption is often represented by the ratio of the amount of herbicide in the soil water to the amount adsorbed. This ratio is called the adsorption coefficient or Kd. The degree of adsorption depends on both the herbicide and the soil properties. The Kd for a herbicide is soil specific and will vary with soil texture and organic matter content.

Another herbicide adsorption coefficient, which is less soil specific is called the Koc. The Koc is the Kd divided by the percent of organic carbon in the soil, a major component of soil organic matter. The higher the value for Kd or Koc, the greater the adsorption. Water solubility and Koc values for herbicides proposed for use in the FEIS are given in Table 3-6 of the FEIS (page 3-45 of the FEIS). The Koc for tebuthiuron is 80 ml/g (pH=7); the Koc for triclopyr is 780 ml/g, clopyralid is 6 and picloram is16 ml/g.

Impacts to surface water as the result of prescribed burning would be short-term (less than 3 years) and would take the form of increased sediment loading due to storm run-off. Impacts would be expected to be less after the first full growing season and diminish over time.

Ground Water Impacts: After treatment, herbicides may move through the soil and into underlying ground-water aquifers by leaching. Herbicide mobility and persistence greatly affect potential for leaching. To pollute ground water, they must then move laterally at concentrations high enough to impair water quality at a point of use. Herbicides move most easily through sand, which is the most porous soil and has the least adsorption potential. The potential for ground-water contamination increases as the depth to the water table and distance to the point of use decrease. Applied at typical rates, herbicides should never occur in ground-water supplies at concentrations exceeding a small fraction of EPA's most stringent drinking-water standards.

Mobility depends on solubility and adsorption; persistence depends on degradation mode and rate. Herbicide properties which determine the likelihood of movement with infiltrating water and leaching index based upon the work of Goss (1988) are given in Table 3-6 of the 1991 Vegetation Treatment FEIS (page 3-45). The leaching index is a relative ranking of the 19 herbicides based upon their chemical properties only. The higher the value, the greater the potential that the herbicides will move through the soil profile with infiltrating water.

Tebuthiuron has a leaching index of 5.36. The leaching index for triclopyr is1.84; the index for clopyralid is 5.46 and picloram is also 5.46 Prediction of actual amounts of these herbicides that may reach groundwater must also consider the method and rate of application, as well as the soil characteristics and other environmental and climactic factors described above.

In response to the concern for ground water contamination, the Environmental Protection Agency developed a rating system to delineate ground water contamination vulnerability. This system, known as DRASTIC, (Aller et al. 1985) is used nationwide and identifies potentially vulnerable areas by factoring depth to water, net recharge, aquifer media, soul media, topography, impact to unsaturated zone, and gross hydraulic conductivity. Figure 2-8 of the 1991 Vegetation Treatment FEIS shows those vulnerable areas. The project area is considered to be a moderate vulnerability (102 $\leq$ varscore $\geq$ 142) area. A site specific DRASTIC will be completed prior to application of herbicides.

Impacts to ground water as the result of prescribed burning would be negligible because of the vegetation recovery after application.

Vegetation: Vegetation treatments would have both beneficial and adverse effects on terrestrial vegetation within the project area. Target and non-target vegetation in treated areas would be directly affected. The degree to which vegetation would be affected would depend on the types of treatment used and the number of acres treated. The overall effect of treating vegetation would be to achieve the desired successional stage, to create a more stratified age structure for wildlife habitat improvement and fuel hazard reduction, to accelerate succession for forest management, and to reduce or eliminate populations of undesirable species in noxious weed eradication programs.

Annual plants are generally more sensitive than perennial plants to chemical treatments because they have limited food storage mechanisms and annual plant populations are greatly reduced if plants are killed before producing seed. Perennials are most sensitive when exposed to herbicides during periods of active growth. Exposure to herbicides during active growth and before plants become reproductive also will have the greatest negative effect on populations of many annuals. The ability of annual or perennial plants to maintain viable seeds in the soil for several years reduces their susceptibility to herbicides. Control of some woody plants on some sites may open the community to dominance by annuals (Evans and Young 1985).

Susceptibility of perennial plants to herbicides depends largely on their ability to resprout after aerial shoots are damaged (Table 3-3 of the 1991 Vegetation Treatment FEIS, page 3-23). Plants that have the ability to resprout after aerial shoot damage are generally least sensitive to herbicides. These plants are damaged most when exposed to herbicides when translocation to meristematic areas and to roots (Sosebee 1983). This generally occurs only when soil temperatures are adequate for root activity and soil water is available. These plants are generally less susceptible to foliar-applied herbicides with limited exposure periods, such as 2, 4-D, than to soil-active herbicides, such as tebuthiuron, that persist in the soil long enough to be taken up when optimum translocation conditions occur.

Differences in active growth periods and phenology of non-target and target species that correspond to differences in sensitivity to herbicides can be used to minimize damage to non-target species.

Response of non-target species to broad-spectrum herbicides, such as glyphosate and tebuthiuron, may be highly dependent on the rate of application. Damage to non-target species is minimized if they are tolerant of these herbicides applied at rate sufficient to reduce target species.

Plants may vary greatly in their sensitivity to different herbicides (Sosebee 1983). Effectiveness of herbicides may vary with different climatic and soil conditions. Soil-applied herbicides are less effective on fine textured soil relative to coarse-textured soils, because herbicide molecules may be adsorbed to clay colloids. Response of non-target plant species to herbicides depends not only on their susceptibility to the herbicide directly, but also on their response to a decrease of target plant species in the community.

Herbicides are mainly used to control woody species, such as mesquite, creosotebush, and snakeweed *(Gutierrezia sarothrae),* in the southwest grassland (Martin 1975, McDaniel 1984). When these plants are successfully controlled, production of herbaceous vegetation may greatly increase (Cable 1976, McDaniel et al. 1982, Gibbens et al. 1987).

Tebuthiuron is more effective than other herbicides in controlling creosotebush, and tarbush *(Flourensia cernua)* (Jacoby et al 1982, Cox et al. 1986, Gibbens et al. 1987). However, tebuthiuron is injurious to many grasses and forbs, especially if applied during active growth (Baur 1976). Tebuthiuron treatments (0.4 lb a.e./acre) in New Mexico reduced woody vegetation and greatly increased perennial grass and annual forb production (Gibbens et al. 1987) Tebuthiuron significantly reduced brush species, including creosotebush, tarbush, wolfberry, fourwing saltbush, snakeweed, and mariola *(Parthenium incanum).* Perennial grass basal areas were initially reduced by treatment, but total grass production of bush muhly *(Muhlenbergia porteri),* threeawn *(Aristida* spp.), bristle grass *(Setaria* spp.), alkali sacaton *(Sporobolus airoides),* spike dropseed *(Sporobolus contractus),* and fluffgrass *(Dasyochloa pulchella)* combined was 11 times greater on the treated than untreated areas after 4 years. Perennial forbs, such as desert holly *(Perezia nana)* and hairyseed balia *(Baileya* spp.), were decreased slightly by tebuthiuron treatment. Production of annual forbs, mainly desert marigold *(Baileya multiradiata),* round leaf wild buckwheat *(Eriogonum jamesii)*, and Russian thistle *(Salsola iberica),* was seven times higher on the treated than the untreated area.

Control of creosotebush by tebuthiuron (0.4 to 1.3 lb. a.e./acre) allowed seeded grasses to persist and native grasses to increase on sites in Arizona and Mexico (Cox et al. 1986). Southwestern grasslands treated with moderate rates of tebuthiuron (less than 1.0 lb a.i/acre) should generally have decreased woody plant production and increased herbaceous production. Certain sensitive grass, forb and shrub species would be replaced by more tolerant species. Moderate application rates and strip treatments are recommended to minimize damage to desirable sensitive species.

Triclopyr is an auxin-type selective herbicide effective against woody plants and broadleaf weeds. The herbicide is particularly effective against root sprouting species, including ash *(Flaxinus* spp.) and oaks *(Quercus* spp.) and is used fro brush and weed control on rangelands, industrial sites, permanent grass pasture and broadleaf and aquatic weed control in rice. However, most grass species are tolerant to triclopyr.

Clopyralid is a systemic, postemergent herbicide that is effective against many species of Compositae, Fabacease, Solanaceae, and Apiaceae. It has auxin-like activity, inducing severe epinasty (downward bending of the plants parts, caused by excessive growth of the upper side) and hypertropy (a nontumorous increase in the size of the plants parts due to the enlargement without increase in number of constituent cells) of the crown and leaves.

Triclopyr and clopyralid significantly reduced brush species, including creosotebush, tarbush, wolfberry, fourwing saltbush, snakeweed, and mariola. Perennial grass basal areas were initially reduced by treatment, but total grass production of bush muhly, threeawn, bristle grass, alkali sacaton, spike dropseed, and fluffgrass combined was 11 times greater on the treated than untreated areas after 4 years. Perennial forbs, such as desert holly and hairyseed balia, were decreased slightly by tebuthiuron treatment. Production of annual forbs, mainly desert marigold, round leaf wild buckwheat, and Russian thistle, was seven times higher on the treated than the untreated area.

Control of mesquite by triclopyr and clopyralid allowed seeded grasses to persist and native grasses to increase on sites in Arizona and Mexico (Cox et al. 1986). Southwestern grasslands treated with moderate rates of triclopyr and clopyralid should generally have decreased woody plant production and increased herbaceous production. Certain sensitive grass, forb and shrub species would be replaced by more tolerant species. Moderate application rates and strip treatments are recommended to minimize damage to desirable sensitive species.

Picloram is an herbicide used for general woody plant control and control of most annual and perennial broadleaf weeds. Picloram is absorbed readily by foliage and roots and acts an auxin-like, growth –inhibiting herbicide. Picloram may damage sensitive grasses as well as broadleaf plants. Picloram (1 lb a.e./acre) applied with or without 2,4-D controlled snakeweed and prickly pear and initially damage blue grama and Needle-and-Thread grass (Gesink et al. 1973). The grasses recovered and had increased production 5 years after treatment. Needle-and-thread grass was more tolerant to picloram than blue grama, and production increased on needle-and-thread grass plots treated at low rates. Picloram may selectively reduce forms and some grasses. Picloram (0.75 to 4 lbs/acre) decreased yarrow, aster, and ironweed and some grasses, such as blue and hariy grama, but picloram did not decrease little and big bluestem, indiangrass, or switchgrass (Arnold and Santelmann 1966).

In summary, many species are sensitive to the rates and types of herbicides that are effective in controlling woody plants in the southwestern shrubsteppe. However, herbicidal treatment usually decreases woody plant growth and increases growth of grasses. Herbaceous production usually initially decreases then increases after a few years as woody species die and herbaceous species recover and respond to reduced competition.

An even application of the pelletized tebuthiuron at the proposed 0.75 pounds of active ingredients will reduce the present composition of creosote bush to an estimated 5 to 10% by the second year after application. This reduction of creosotebush eliminates the competition for soil water, which is critical in sandy soil where the moisture holding capacity is quite low. The lack of competition will readily allow grass and forbs to flourish, increasing the amount of ground cover, reducing the amount of soil erosion as well as producing an abundance of livestock and wildlife forage.

The change in composition of the vegetative community will have the effect of changing the entire area of treatment from a desert shrubland habitat to a grassland habitat in a very short period of time (approximately 2 to 3 years). A change from shrubland to grassland will change the animal community to one that is representative of grassland habitats.

Prescribed fire typically does not kill southwestern grass species (Warren, et al 1999). This is because fires are usually fast moving and do not burn into the root crown. This allows the grass plants to resprout. Prescribed fires top kill sprouting shrubs such as mesquite and killed seedlings, which maintains the area as a grassland with scattered shrubs. Grass species recovery is dependent upon post-treatment precipitation, plant vigor prior to burning, relative humidity at time of burning, and post-treatment grazing pressure. Depending upon the amount of post-treatment precipitation, grasses can recover as quickly as the first growing season. Without sufficient post-treatment moisture, recovery could take several years to reach pre-treatment levels.

Some sensitive grasses, broadleaves and non-target shrub species may be damaged by the application of the herbicides. It is expected that these species will recover rapidly and will increase in production. An increase in grass production will allow for prescribed fire to be used to maintain the herbicide treated areas in their desired condition.

Livestock: The goals of rangeland treatment methods for livestock include suppressing plant species that are undesirable and/or toxic and improving forage production by controlling competing vegetation. Livestock could be affected directly by ingesting poisonous weeds and indirectly by changes in forage supply and herbicide exposure.

Chemical treatments are generally applied in a form or at such low rates that they do not affect livestock. Treatment would be applied when livestock are not in the project area.

Based on the risk analysis in Appendix E-8 of the 1991 Vegetation Treatment FEIS, the estimated doses for livestock would be well below the EPA risk criterion of 1/5 LD50 for all of the program herbicides. Therefore, the risk of direct toxic effect to these animals is negligible, even assuming exposure immediately after treatment.

Using herbicides is the most efficient and effective way to control some competing vegetation and noxious weeds. However, some aerially applied herbicides also may eliminate some shrubs and trees that livestock need for shelter.

Following chemical application and/or prescribed burning, the treated areas would be rested from livestock grazing to allow the forage species time to produce leaves, stems and leaders which would build up root reserves. This post-treatment rest could be considered a negative impact, as alternative grazing must be located for the livestock normally using the treated area.

Invasive, Non-native Species: As the proposed action is to apply these herbicides by aerial application, no new populations of Invasive or non native species should be introduced. Implementation of prescribed fire may introduce invasive species if precautions are not taken to thoroughly clean the equipment prior to use on the project area.

Wildlife: Wildlife species depend directly on vegetation for habitat, so any change in the vegetation of a particular plant community is likely to affect the wildlife species associated with that community. Any change in community vegetation structure or composition is likely to be favorable to certain animal species and unfavorable to others (Maser and Thomas 1983).

The key to understanding the effects of vegetation manipulation on wildlife involves an understanding of the vegetation structure, production, flowering and fruiting of the community; these characteristics relate to seasonal cover and food requirements for particular animal species and predators dependent on them. These characteristics also respond to a particular vegetation manipulation.

Plant communities on many western rangelands are no longer pristine and therefore do not support pristine populations of wildlife species. Many rangeland plant communities have alien herbaceous weeds or a high ratio of woody to herbaceous perennial vegetation than under pristine conditions. These vegetation conditions may favor certain wildlife species, such as the chukar partridge *(Alectoris chukar)*, which depends on the alien annual grass, cheatgrass *(Bromus tectorum)* for food (Weaver and Haskell 1967), or they disfavor other species, such as pronghorn *(Antilocapra americana),* which require mixed-plant communities, rather than those dominated by a few woody or herbaceous species (Yoakum 1975). In general, the greater the diversity of the plant community, the greater the diversity of the associated animal community (Gysel and Lyon 1980). Therefore, any change in vegetation community structure or composition affects resident fish and wildlife populations.

The effects of vegetation manipulation on wildlife depend on vegetation structure, production, and phenology of the community. Because these characteristics relate to seasonal cover and food requirements for particular animal species- and the predators that depend on them- and because these characteristics respond differently to different vegetation manipulations, effects on fish and wildlife from vegetation management would be both positive and negative, depending on the species affected and the type of treatment used. Treatments that reduce runoff and sedimentation would have positive benefits for fish and aquatic wildlife and there would be shifts or changes in forage and habitat for wildlife, depending on the species.

Chemical treatments, like mechanical methods traditionally have been applied most frequently to decrease woody plant cover and increase the production of grasses. The control of broad-leafed woody plants, especially by selective herbicides, often results in the control of associated broadleaf forbs, both categories of plants contain species which may be important food for many different wildlife species.

Although most documented cases consider the effects on wildlife of vegetation treatments designed to increase grass production, chemical treatments can be selected and structured to increase and decrease other vegetation components for the benefit or exclusion of different wildlife species. These treatments can be considered tools for wildlife habitat management when vegetative responses and habitat requirements are understood. All treatments will affect some change in the existing wildlife communities, including amphibians, reptiles, and invertebrates. The end result of the treatment should be more beneficial to wildlife in general than the community and/or populations foregone by the treatment.

Aerial herbicide applications have the most significant potential for affecting wildlife. When determining the timing of herbicide applications, considerations should be given to the potential for humans to consume wildlife that have fed on herbicide-contaminated forage. The treated area could be posted to notify the public of the possible contamination, if herbicides pose any risk. Also the effect of herbicide consumption of lactating mammals or the feeding of contaminated foods to offspring must be considered. Some negative impacts can be lessened if the period of treatment avoids the bird nesting season and other critical seasons when loss of cover would be critical to wildlife; for example, during critical reproductive periods and prior to severe winter weather conditions.

Most riparian areas are crucial habitat for wildlife and no treatments are proposed. The primary practice will be for riparian areas to be buffered and protected from any impacts.

The BLM Pest Control Handbook, H-9011-1, requires buffering of domestic waters, perennial marsh areas, important fishing and recreational waters, and/or significant fish spawning, rearing and migration streams. Recommended buffers are the larger of the herbicide label recommendation or 25 horizontal feet for vehicle spraying and 100 horizontal feet for aerial spraying. The Roswell RMP (Appendix 9, Treating Vegetation with Herbicides) also states buffers for herbicide applications: aerial spraying 100 feet, 25 feet for vehicle spraying and 10 feet for hand application for projects adjacent to the Pecos River, any livestock watering locations, ranch houses, or known locations of threatened or endangered plants. The RMP also includes requirements for protective buffer zones to be provided around important riparian or wetland habitats along streams, rivers, lakes that are not designed to be treated, and around xeroriparian areas along important dry water courses. Each of these buffering requirements has been included in the project stipulations and designs.

Chemical treatments have most frequently been applied to reduce the cover of woody species, such as mesquite (Martin 1975). Although research has described the life history and habitat requirements of many wildlife species, only limited research has addressed the effects of vegetation manipulations on wildlife in southern Arizona and New Mexico.

Expanding the structural diversity of vegetation by controlling shrubs and increasing understory species in strips and patches should increase bird diversity and density. However, such control could decrease deer use by reducing food and cover. Smith (1984) compared bird use of undisturbed, crushed and tebuthiuron-treated creosotebush in Arizona. Black-throated *(Amphispiza bilineata)* and Brewer's sparrows *(Spizella breweri)* foraged opportunistically, which verdins *(Auriparus flaviceps)* avoided crushed plots and vesper sparrows *(Pooecetes gramineus)* avoided control plots. In the catclaw acacia and creosote community, chemical treatments opened up small areas, which were used as nesting sites for Cassin's sparrows *(Aimophila cassinii)* and feeding sites for grass-eating flocks.

Pronghorn are expected to benefit from the increase of forb and grass species following creosotebush control.

After treatment of catclaw acacia and creosotebush the increase of forb and grass species would most likely lead to an increase in use of the treated areas by wildlife species such as pronghorn, mule deer, quail, and dove, which in turn could lead to an increase in the number of hunters using the area. The recreational value will correspond to the availability of animals for hunting or viewing.

The primary recreational activity occurring in the project area is hunting. Mule deer and game birds such as quail and dove are taken during hunting seasons set by New Mexico Department of Game and Fish. A secondary activity occurring in the area is observing nature or watching wildlife. No unique natural features are present.

The application of prescribed fire would have immediate impacts in the form of displacement of many terrestrial species during the actual firing operations. If not conducted during a time period that considers migration, breeding and nesting, and fawning, prescribed fire could decrease the use of the area by wildlife. The impacts would still be short-term as there is similar adjacent habitat available.

Wildlife would be temporarily displaced from the area during the burning and for a short time afterwards. Larger mammals such as coyotes *(Canis latrans)* and mule deer typically leave the treatment area before burning starts as a result of the increase in human presence on the burn days. Direct kills of smaller mammals as a result of the proposed action would be low, although some could suffocate as a result of the smoke and heat. It may be possible that small mammal populations could decrease temporarily as a result of the loss of cover in would make them more susceptible to predation. The small mammal populations should recover to or above pre-treatment levels as the vegetation recovers.

Birds would be less directly affected by the proposed action, as they are more mobile. A burn that results in a mosaic of burned and unburned areas would benefit the greatest number of bird species by providing increased plant diversity and edge effect.

Prescribed fire can ultimately benefit most ground nesting birds by increasing cover for ground nests which reduces nest predation. The proposed action could improve forage habitat by removing litter, which improves forage areas, and by increasing the composition of forbs, which would increase the quantity and quality of the forage. A negative impact would occur if the timing of the proposed action coincidences with nesting activities. There is the potential that nests would be destroyed during the proposed action; however, the adult birds should be able to escape and renest in unburned areas.

Special Status Species: Several state and federal candidate species and other sensitive species may occur within the project area on a seasonal basis. The swift fox *(Vulpes velox)* is a Federal Candidate species that may occupy or utilize the area year round; refer to the Biological Opinion (AP11-38) in the Roswell RMP for a detailed description of the range, habitats and potential threats.

The Baird's sparrow *(Ammódramus baírdii)* and burrowing owl *(Athéne cuniculária),* may utilize the area on a periodic basis, but due their habitat requirements and the amount of surrounding habitat that will remain like the existing situation, no negative impacts are anticipated.

Cultural: Before authorizing vegetation treatment actions that could affect cultural resources, cultural properties eligible for inclusion in the National Register of Historic Places will be identified and considered through the process outline in the National Historic Preservation Act of 1966 and implemented in 36 CFR 800 and the BLM 8100 Manual series. It is unlikely that cultural artifacts protected by soil or plant cover would be adversely affected by chemical treatments.

Wherever bladed firelines are to be built, a cultural survey would occur prior to blading. Significant archeological and historic sites would be avoided. Should cultural material be discovered during blading, fireline work would cease until the cultural resource issue is resolved. Significant cultural resources would be protected from further disturbance.

Visual Resource Management: Public land has many different visual values. Visual values are identified through the Visual Resource Management (VRM) inventory and are grouped into four visual resource inventory classes, which represent the relative value of the visual resources. Classes I & II are the most valued, Class III is moderately valued, Class IV is the least valued. The criteria for determining the classes are scenic quality, sensitivity level, and distance zone. Landform, vegetation, water, color adjacent scenery, scarcity and cultural modification area used in determining an area's scenic quality (BLM 1986).

An adverse visual impact is any modification in landforms, water bodies, or vegetation or any introduction of structures that disrupt negatively the visual character of the landscape and the harmony of the basic elements (that is, form, line, color, and texture).

Where areas are treated by methods that could significantly change visual contrast (quality), short-term adverse impacts on visual resources would occur. However, based on standard operating procedures and long range plans, the long-term impacts would be beneficial. The intensity of the impacts would depend on the treatment method and the area where it was implemented. Most of the land considered for the vegetation treatment program in the FEIS is Class IV; therefore, the impacts that might occur from any of the treatment methods would not be as important as in a Class I or II area. Factors that effect the degree of visual contrast area: distance, angle or observation, length of time in view, relative size or scale, season of use, light conditions, recovery time, atmosphere conditions and motion.

Herbicide use reduces the variety of vegetation and may prevent the manifestation of seasonal changes such as spring flowers and fall color in a treated area. Areas treated with herbicides turn brown and contrast with surround vegetation for a short period of time. However, applying herbicides could have the positive visual impact of allowing regrowth of more aesthetically desirable vegetation.

The proposed action would change the color and texture of the landscape by replacing the creosotebush mesquite or cholla cover with grasses and forbs. However, it can be argued whether the visual change is positive or negative. The resulting landscape, as seen from Highway 70/380, will still appear natural to the casual observer. To mitigate potential visual impacts, lines between treated and untreated areas should be irregular with no straight edges.

There are no unique natural or man-made features which will interfere with the proposed action or the alternatives. The area has been placed in Visual Resources Management Class III or IV. Both of these Classes allow change in the scenery to occur. The sensitivity of the area is low.

Prescribed burning would have an effect for approximately one growing season while the area is in a blackened condition. After one year the area should return to a normal looking condition.

Social and Economic: A description of the social and economic impacts are discussed on pages 3-119 of the FEIS. Site specific conclusions would be essentially the same.

Social Resources: Many of the social effects of vegetation treatment programs occur as a result of changes in jobs or personal income. Compared with total employment or personal income, employment or income changes resulting from the implementation vegetation treatment may seem small. However, these changes may be important when considered on a local or a site specific basis to individuals who rely on the continued productivity of public lands and employment in vegetation treatment activities for their livelihood.

Direct impacts would occur if an individual's sense of well-being or economic security were affected by BLM's decision on the use or restriction of particular vegetation treatment methods. Indirect effects would occur as a result of economic outcomes of BLM policies and in response to gains or losses of recreational opportunities or access to subsistence activities. All of these impacts, direct or indirect, could affect lifestyles and community stability.

Economic Resources: The direct economic impacts of all of the vegetation program alternatives include increases in both employment and sales of treatment materials. The subsequent increase in personal incomes and revenues would benefit the economy of the area if the employees and equipment needed are acquired within the area.

Indirect Economic Impacts: Indirect economic impacts occur as a result of other actions, such as other vegetation treatments, outside the project area. They are generally difficult to quantify and the incidence of the sort of these impacts is not always clear. Poor range management may result in the death of livestock and wildlife because of ingestion of noxious weeds and poisonous plants.

Human Health: A detailed hazard analysis was conducted for clopyralid, picloram, tebuthiuron and triclopyr as proposed here for use in the FEIS (See Appendix E of the FEIS). Additionally, a worst-case analysis was conducted for each of the herbicides proposed for use. It has been determined that the worst-case is that someone would get cancer from exposure to herbicides used in the Bureau of Land Management (BLM) Vegetation Treatment Program. The probability of occurrence was projected for two basic populations considered at risk (occupational and general public). The highest probability of cancer for workers in the extreme-case is on the order of one out of 10,000 workers exposed under the lifetime exposure scenario. The highest probability for the general public in on the order of one out of 10 million individuals exposed in the extreme case scenario presented.

B. Impacts of Alternative A – Manual Treatment

Air: This alternative eliminates the potential impacts from herbicides of the Proposed Action.

Soil: Vegetation treatments may affect the physical characteristics of soil directly, alter the abundance and types of vegetation that may shield soil from erosion, or alter the presence and abundance of soil microorganisms or larger organisms that contribute to overall soil quality.

The effects of this alternative on the soil would be substantial. The increased organic material, caused initially by the acacia and creosote leaves, stems and roots and secondarily by the increased production of grasses and forbs would improve the fertility of the fine sandy loam soil.

Water: This alternative eliminates the potential impacts from herbicides of the Proposed Action. This alternative would not increase peak flows because plant water use would be little affected. Stream nutrients and sediment loads would not increase because litter and duff would be left intact.

Vegetation: Vegetation treatments would have beneficial and adverse effects on terrestrial vegetation within the treatment area. Target vegetation in treated areas would be directly affected. Non-target vegetation would not be affected.

Livestock: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Impacts to livestock grazing management (rest until the treated area recovers, usually two growing seasons) would be the same as the Proposed Action.

Invasive, Non-native Species: Invasive and Non-Native species may be introduced or spread by manual treatment if normal care is not taken to clean all equipment being used in and around the project sites.

Wildlife: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Manual treatment, however, would negatively affect those species that depend on the target plants for food or cover.

Special Status Species: Impacts would be similar to those in the Proposed Action.

Cultural: Before authorizing vegetation treatment actions that could affect cultural resources, cultural properties eligible for inclusion in the National Register of Historic Places will be identified and considered through the process outline in the National Historic Preservation Act of 1966 and implemented in 36 CFR 800 and the BLM 8100 Manual series. It is unlikely that cultural artifacts protected by soil or plant cover would be adversely affected by manual treatments.

Recreation: Hunting and hiking, off highway vehicle activity and other actions will still occur within propose area. There should not be any adverse actions by the proposed action.

Cave/Karst: Some of the area is in Medium Karst potential. Within these areas vehicles traveling over cave/karst areas should be careful not to drive over cave entrances as well as highly developed karst areas that may collapse under the vehicle.

Visual Resource Management: Impacts would be similar to those in the Proposed Action.

Social and Economic: The direct and indirect social and economic impacts of manual treatment would be essentially the same as the Proposed Action.

Human Health: Under this alternative, risks of public and worker health effects from herbicides would be eliminated. Risks to workers, however, from manual or mechanical treatment would increase.

C. Impacts of Alternative B – Mechanical Treatment

Air: This alternative eliminates the potential impacts from herbicides of the Proposed Action. The impacts of this alternative, however, would be increased dust particles during the treatment itself as well as dust as the result of wind erosion until the grasses and forbs re-establish themselves in the treated areas,

Soil: Vegetation treatments may affect the physical characteristics of soil directly, alter the abundance and types of vegetation that may shield soil from erosion, or alter the presence and abundance of microorganisms or larger organisms that contribute to overall soil quality.

The effects of this alternative on the soils would be substantial. Removing acacia and creosote by this method also removes grasses and forbs, resulting in large areas of bare soil. This alternative would result in an increased risk of soil erosion due to wind and rain until the grasses and forbs re-establish themselves in the treated area.

Water: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Precipitation runoff would increase and an associated increase in stream volume and peak volume. Loss of vegetation cover would result in increased erosion potential and subsequent sediment loads.

Vegetation: Vegetation treatments would have beneficial and adverse effects on terrestrial vegetation within the treatment area. Target and non-target vegetation in treated areas would be directly affected.

Livestock: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Impacts to livestock grazing management (rest until the treated area recovers, usually two growing seasons) would be the same as the Proposed Action.

Invasive, Non-native Species: Impacts would be similar to those of Alternative A.

Wildlife: Impacts would be similar to those of Alternative A.

Special Status Species: Impacts would be similar to those in the Proposed Action.

Cultural: Mechanical treatment could damage archeological and historic sites. In order to avoid damaging sites, cultural inventory surveys would need to be conducted prior to project implementation in order to locate and avoid eligible and potentially eligible sites. Buried sites discovered by mechanical treatment may also increase the possibility of artifact theft due to site exposure. Performing cultural surveys to mitigate these impacts would add substantially to the cost of the project.

Visual Resource Management: Impacts would be similar to those in the Proposed Action.

Recreation: Hunting and hiking, off highway vehicle activity and other actions will still occur within propose area. There should not be any adverse actions by the proposed action.

Cave/Karst: Some of the area is in Medium Karst potential. Within these areas vehicles traveling over cave/karst areas should be careful not to drive over cave entrances as well as highly developed karst areas that may collapse under the vehicle.

Social and Economic: The direct and indirect social and economic impacts of manual treatment would be essentially the same as Alternative A – Manual Treatment.

D. Impacts of the No Action Alternative

The No Action Alternative avoids the impacts of herbicide applications and prescribed fire. Therefore, under the No Action alternative present conditions will not significantly change. The area will primarily remain in a status quo condition with the areas dominated by shrub species and their present effects. Shrub species would continue to encroach and increase to the detriment of the native habitat and the species that rely on that habitat. Due to no changes in habitat composition or condition wildlife populations will remain unchanged. No increase of forage or stabilization of soil will occur. No increase in use by recreationalists would occur. Movement towards the goals of Desired Plant Community or improvement in public land health would not occur.

E. Mitigation Measures and Residual Impacts

Mitigation Measures
Any project involving herbicides would follow the policies, standards and practices listed in Appendix 9, Treating Vegetation with Herbicides, of the 1997 Roswell RMP. In addition to the mitigation measures listed in the Proposed Action, the following measures would also apply:

- In areas of Medium cave/karst potential the area will be reviewed by the Roswell Field Office Outdoor Recreation Planner to determine if there is cave or karst features within the area. If cave/karst features are found, heavy equipment should not be used within these areas and surface disturbance shall be kept to a minimum within these areas.

- Livestock numbers would not increase as a result of any of the treatments covered in this analysis. The livestock operator must demonstrate to BLM staff that any net increase in animal unit months (AUMs) is the direct result of the livestock operator's ability to manage livestock in balance with watershed capacity to provide forage, maintain livestock distribution and proper grazing use to restore rangeland health prior to any increases in authorized increases in animal numbers.

- BLM would ensure that the agreed upon level of cultural inventory is completed prior to implementation, and will protect sensitive areas using buffer zones, hand treatment of vegetation, removal of heavy fuels or other actions agreed to under the provisions of the Protocol Agreement between the New Mexico Bureau of Land Management and New Mexico State Historic Preservation Officer. These procedures will ensure compliance with the National Historic Preservation Act. The appropriate mitigation measures may be implemented after consultation with New Mexico State Historic Preservation Officer.

Residual Impacts: Implementation of the proposed action or of the alternatives would all have the same potential for unavoidable adverse environmental impacts. They are as follows:

- Short-term reduction in air quality from dust and engine emissions resulting from the equipment being used in the application of the herbicide.

- Short-term change in chemical composition of the uppermost soil layers due to the change in abundance of organic matter.

-A temporary increase in fire hazard from waste material (dry vegetation) left on the ground after treatment.

-Short-term decrease in habitat for wildlife species.

-Short-term increase in smoke and particulate matter.

IV. COST-BENEFIT ANALYSES

The objective of this proposed project is to reduce the amount of catclaw acacia, mesquite, cholla and creosote in relation to the overall vegetative community, and to improve the amount of vegetative cover for watershed protection, wildlife habitat and restore the vegetation to a natural composition. The value of the benefits of this project (improved watershed protection, wildlife habitat and vegetation composition) would be the same regardless of the treatment method chosen. Therefore, the only difference is the cost of the treatment methods. The Record of Decision for the Vegetation Treatment on BLM Lands in Thirteen States Final EIS (FEIS) of May 1991 states BLM will identify the most economical treatment practice. As shown below, the Proposed Action is the most economical

For the purposes of analyses, 16,000 acres, (approximately one-half the public land acres within the project area) will be used as maximum treated area.

A. Proposed Action

Application of the herbicides by aircraft costs approximately $30 per acre. Total cost of treating the 16,000 acres would be approximately $480,000.

Application of prescribed fire costs approximately $20 per acre. Total cost of treating 16,000 acres would be approximately $320,000.

B. Alternative A – Manual Treatment

The cost of manual treatment is approximately $450 per acre. Total cost of treating the 16,000 acres would be approximately $7,200,000.

C. Alternative B – Mechanical Treatment

The cost of mechanical treatment is approximately $300 per acre. Total cost of treating the 16,000 acres would be approximately $4,800,000.

V. CUMULATIVE IMPACTS

Impacts of reducing the amount of acacia catclaw, creosote, mesquite and cholla would be confined to the Hondo basin. The Hondo basin originates in the Sacramento

Mountains in which the major streams are the Rio Bonito and Rio Ruidoso which join to form the Hondo River. The Hondo flows east, out of the mountains, across the Pecos plains through the city of Roswell and empties into the Pecos River south of US Highway 380.

Past treatments within the Hondo basin have occurred regardless of the alternative chosen. BLM records show four other chemical treatment projects and six manual treatment projects in the Hondo basin in the past seven years. The projects range in size from 500 to 3,000 acres. The object of these projects was to restore rangelands to conditions that more closely approximately their ecological site descriptions.

Upstream of the treatment area in the Hondo basin is the Fort Stanton Area of Critical Environmental Concern (ACEC). BLM has carried out and plans to carry out watershed improvement projects on the 24,000-acre ACEC. These projects, with one exception, are either manual treatments or prescribed fires conducted with the goal of improving the health of the watershed by reducing the amount of woody vegetation (trees and brush species). The one exception was a chemical application to control noxious weeds.

Proposed Action: The treatment area (proposed and adjacent) along with the untreated areas Hondo basin would have the cumulative impact of a more diverse vegetative composition. The results of the Proposed Action would not substantially change the plant and animal communities of the project area. The proposed action would result in beneficial effect to the soil and animal life through more diverse vegetation.

According to label information tebuthiruon, picloram, triclopyr and clopyralid are non-carcinogenic and non-mutagenic. Any cumulative impact of the treating of catclaw acacia, mesquite, cholla and creosote on wildlife would be dissipated by the condition of the surrounding treated areas outside this allotment. The conditions would result from the dates that the other areas were treated, the life span of those projects, and whether these areas have been recently treated (less than three years) or are nearing the end of the projects life span (approximately 15 to 20 years) or never have been treated. Wildlife would utilize the different areas at varying levels of use for feeding, protection, cover and reproduction. Long lasting effects of chemicals on wildlife would not occur, according to the EIS on Vegetation Treatment on BLM Lands in Thirteen Western States.

The introduction of prescribed fire would begin the process of restoring fire to its role in the ecosystem. This would yield long-term benefits to the natural resources within the project area.

The benefits of the proposed action could last up to an estimated 15 years. The proposed action and other projects conducted by BLM in the Hondo basin outside the project area will have cumulative impacts that should increase the function of the watershed and the health of the public land.

Alternative A – Manual Treatment: BLM has no plans for manual treatments for the Hondo basin outside the Fort Stanton ACEC. Cumulative impact from manual treatments would be confined to the Fort Stanton ACEC.

Alternative B – Mechanical Treatment: BLM records show no other mechanical treatment projects in the Hondo basin in the past seven years. No future mechanical treatments are planned. With no mechanical treatments in the past and none planned or foreseen in the future, no impacts from mechanical treatments would accumulate.

No Action Alternative: See the previous discussion under Impacts of the No Action Alternative.

VI. COMMITMENT OF RESOURCE

The proposed action is a non-reversible and irretrievable commitment of the rangeland resource.   Irreversible and irretrievable commitments would be minimal, but would include some short-term soil movement and some level of mortality to small mammals within the proposed burn areas.

VII. SUMMARY

The results of the proposed action would change the plant and animal communities of the treatment area. The proposed action would result in beneficial effects to the soil, water, and animal life. The treatment of a small area as proposed would not affect the environment as a whole, but effects would be site specific.

VIII. PERSONS OR AGENCIES CONSULTED

The following are people who have been consulted and their comments in regards to the proposed action other than the field office specialists.

Royce Griggs, Foreman of the Rio Hondo Ranch, Allotment #64060

<u>BLM Staff</u>
Howard Parman, planning and environmental coordinator
Richard Hill, environmental protection specialist
Dan Baggao, wildlife biologist
Melvin Moe, wildlife biologist
Pat Flanary, archaeologist
Paul Happel, natural resource specialist
Michael McGee, hydrologist
John Simitz, geologist
John Spain, range conservationist specialist
Helen Miller, range conservationist specialist
Irene Gonzales, Reality Specialist
Jerry Dutchover, Geologist

IX. LITERATURE CITED

Aller, L., T. Bennett, J.H. Lehr, and R.J Petty, 1985 DRASTIC: A standardized system for evaluating ground water pollution potential using hydrogeologic settings. EPA/600/2-85/018. Ada, Okla., 130 pp.

Arnold, W. R., and P. W. Santelmann, 1966. The response of native grasses and forbs to picloram. Weeds 14: 74-76.

Bauer, J. K. 1976. Effects of picloram and tebuthiuron on establishment of rye grass winter pasture. Journal of Range Management 31:450-455.

Cable, D. R. 1976. Twenty years of changes in grass production following mesquite control and reseeding. Journal of Range Management 29: 286-289.

Cox, J. R., R., M. H. Martin, F.A. Ibarra F., and H.L. Morton. 1986. Establishment of range grasses on various seedbeds at creosote (Larrea tridentate) sites in Arizona, U.S.A., Chihuahua, Mexico Journal of Range Management 34:540-546.

Evans , R.A., and J. A. Young. 1985. Plant succession following control of western juniper *(Juniperus occidentalis)* with picloram. *Weed Science* 33: 63-68.

Gibbens, R. P., C. H. Herbel, and J. M. Lenz. 1987. Field scale tebuthiuron application on brush–infested rangeland. Weed Technology 1: 323-327.

Gesink, R. W., H. P. Alley, and G. A. Lee. 1973. Vegetative response to chemical control of broom snakeweed on a blue grama range. *Journal of Range Management* 26: 139-143.

Goss, D. 1988. Pesticide-soil interaction: Potentials for loss. In: Integrating water quality and quantity into conservation planning. Soil Conservation Service and Cooperative Extension Service Joint Water Quality Workshops. October-November, 1988.

Gysel, L. W., and L. J. Lyon. 1980. Habitat analysis and evaluation. In Wildlife Technical manual, ed. S. D. Schemnitz, 305-327. Washington, DC: The Wildlife Society.

Jacoby, P. W., D. N. Ueckert, and F. S. Hartman. 1982. Control of creosote (Larrea tridentata) with pelleted tebuthiuron. Weed Science 30:307-310.

Martin, S. C. 1975 Ecology and management of southwestern semidesert grass-shrub ranges: The status of our knowledge. Research Paper RM-156. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Station

Maser, C., and J. W. Thomas. 1983. Wildlife habitats in managed rangelands – The Great Basin of southeastern Oregon. Introduction. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-160- United States, Pacific Northwest Forest and Range Experiment Station.

McDaniel, K. C., R. D. Pieper, and G. B. Donart. 1982. Grass response following thinning of broom snakeweed. Journal of Range Management 35: 219-222.

McDaniel, K.C. 1984. Snakeweed control with herbicides. Bulletin 706 Las Cruces, NM: New Mexico State University, Agricultural Research Station

Norris, L.A., and D.G. Moore. 1981. Introduced chemicals and water quality. In Interior, west watershed management symposium: 1980 April 8-10, Spokane, WA, ed. D.M. Baumgartner. 203-220. Pullman, WA: Washington State University, Cooperative Extension.

Smith, B. H. 1984. Avian habitat selection in a mixed creosotebush-grassland community. Master's thesis, University of Arizona, Tucson.

Sosebee, R. E. 1983. Physiological, phonological and environmental consideration in brush and weed control. In Proceedings of brush management symposium, ed. K.C. McDaniel 27-34. Denver, Co: Society for Range Management.

Weaver, H. R., and W. L. Haskell. 1967. Some fall foods of Nevada chucker partridge. Journal of Wildlife Management 31: 582 – 584.

Yoakum, J. D. 1975. Antelope and livestock on rangelands. Journal of Animal Science 40: 985-988.

FINDING OF NO SIGNIFICANT IMPACT/RATIONALE

FINDING OF NO SIGNIFICANT IMPACT: I have reviewed this environmental assessment including the explanation and resolution of any potentially significant environmental impacts. I have determined the proposed action with the mitigation measures described will not have significant impact on the human environment and that preparation of an Environmental Impact Statement (EIS) is not required.

Rationale for Recommendations: The proposed action would not result in any undue or unnecessary environmental degradation. The proposed action will meet the objectives of the Roswell Resource Management Plan.

/s/T. R. Kreager 10/23/06

T.R. Kreager, Assistant Field Office Manager, Resources Date